

METHODS AND APPARATUS FOR DETECTING
REFRIGERATOR DOOR OPENINGS

ABSTRACT OF THE DISCLOSURE

5 A detection apparatus for detecting refrigerator door openings is coupled to at least one switch configured to be activated by a door opening. When the door is opened, the switch is activated and inputs a signal to the detection apparatus. The detection apparatus rectifies the signal; and phase-shifts the rectified signal so that it leads or lags the line voltage. The shifted output signal is fed to a processor that detects the opening of the door based upon the shifted signal. Signals output by a plurality of switches that generate a signal when activated mixed using an opto-coupler. Relative impedance of the lead and lag circuits may be adjusted to differentiate a phase shift of one shifted signal relative to another signal. The processor converts a value in degrees of phase shifting of the mixed signal to a time value, and based upon the time value, the processor determines which of the doors is open.

10